

July 6, 2011

MEMORANDUM TO: Douglas A. Broaddus, Chief
Plant Licensing Branch II - 2
Division of Operating Reactor Licensing

FROM: Christopher Gratton, Senior Project Manager */RA/*
Plant Licensing Branch II - 2
Division of Operating Reactor Licensing

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNIT 1 - AUDIT PLAN
REGARDING THE AREVA FUEL TRANSITION EMERGENCY
CORE COOLING SYSTEM EVALUATION MODEL
APPLICATION

The staff has prepared an audit plan related to the review of the AREVA EXEM BWR-2000 emergency core cooling system evaluation model, insofar as it has been applied to support a requested transition to AREVA fuel, and safety analysis methods at Browns Ferry Nuclear Plant, Unit 1, scheduled for the week of July 18, 2011. The audit plan describes the scope and purpose of the audit. The audit plan is attached.

Enclosure:
As stated

Docket No. 50-259

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AUDIT PLAN
EMERGENCY CORE COOLING SYSTEM EVALUATION MODEL
BROWNS FERRY NUCLEAR PLANT, UNIT 1
DOCKET NO. 50-259

Scope and Purpose

Review of the Browns Ferry, Unit 1 Fuel Transition license amendment request requires review of the application of the emergency core cooling system (ECCS) evaluation model.

The audit is intended to address issues identified during the U.S. Nuclear Regulatory Commission (NRC) staff's review of a request to transition from Global Nuclear Fuels-supplied fuel and General Electric-Hitachi-supplied safety analysis to AREVA-supplied fuel and safety analysis. During the NRC staff review, the presence of significant top-down cooling was identified in the most severe loss-of-coolant accidents analyzed by AREVA. The NRC staff was unable to conclude that such top-down cooling was based on adequate models.

To address the NRC staff concerns, the Tennessee Valley Authority (TVA) is preparing a modified ECCS evaluation and intends to augment the Browns Ferry ECCS evaluation with analyses that address the staff concerns with top-down cooling performance. The purpose of this audit is to review the modified evaluation and the related analytic results.

While the staff will need to review information concerning the modified ECCS evaluation, for the sake of brevity, the staff does not intend to repeat a detailed review of the generically approved aspects of the evaluation model, nor does it intend to review the phenomena depicted in the supplemental analytic results in detail unless those phenomena appear to have significance in the most severe calculated loss-of-coolant accidents.

The staff's review of the modified evaluation will be conducted in accordance with NUREG-0800, *Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition*, Section 15.0.2, "Review of Transient and Accident Analysis Methods." The SRP directs the staff to review the complete code documentation including, but not limited to: (a) the evaluation model, (b) the accident scenario identification process, (c) the code assessment, (d) the uncertainty analysis, (e) a theory manual, (f) a user manual, and (g) the quality assurance program.

Enclosure

SRP 15.0.2 Section III.2.D:

The reviewers should ensure that [1] all code closure relationships based in part on experimental data or more detailed calculations have been assessed over the full range of conditions encountered in the accident scenario... [2] integral test assessments properly demonstrate physical and code model interactions that are determined to be important for full size plant accident scenarios... [and 3] the documentation contains comparisons of all important experimental measurements with the code predictions in order to expose possible cases of compensating errors.

SRP 15.0.2 Section III.2.F:

The reviewers should confirm that the evaluation model is maintained under a quality assurance program that meets the requirements of Appendix B to 10 CFR 50. As a minimum, the program must address design control, document control, software configuration control and testing, and corrective actions. The reviewers should confirm that the quality assurance program documentation includes procedures that address all of these areas. The reviewers may conduct an audit of the implementation of the code developer's quality assurance program.

The audit scope does not explicitly include an assessment of the quality assurance program, but may include those aspects pertaining to code and methodology changes. If the code developer (AREVA) has modified the codes executing the approved steady state and transient methodologies approved by the NRC, or if the analytic method employed for Browns Ferry differs from that described in the approved methodology, the scope of the audit may encompass the review process for these changes in terms of the process requirements and applicable requirements of 10 CFR 50.59 and 10 CFR Part 50 Appendix B.

The audit will also include a review of analytic results to aid the staff in determining whether the EXEM BWR-2000 ECCS evaluation model has been applied in a manner that demonstrates (1) that the Browns Ferry-specific ECCS performance evaluation conforms to the required and acceptable features of an ECCS evaluation model set forth in Appendix K to 10 CFR Part 50, and (2) that the Browns Ferry ECCS evaluation appropriately demonstrates compliance with the requirements of 10 CFR 50.46.

Audit Logistics

The audit is expected to last from 8:00 AM local time Tuesday, July 19, 2011, to close of business Thursday, July 21, 2011. It will be conducted at the AREVA facility located on Horn Rapids Road in Richland, Washington. The agenda will include:

- Review of applicable code documentation, including theory manuals
- Review of applicable quality assurance program documentation and procedures
- Review of applicable code change procedures and requirements
- Review of applicable code and method changes since NRC approval of the methods
- Review of the code assessment database and analyses
- Review of the analysis method as coded

- Review of recent analytic results
- Discussion of staff requests for additional information (RAIs)

If the audit is not completed in 5 business days the NRC will request that TVA provide the staff access to the requested documents at a location more convenient to NRC HQ so that the staff can continue any remaining portions of the audit.

Audit Team

The audit team will consist of:

- One Engineer, Division of Safety Systems, Reactor Systems Branch

Required Documentation

The audit scope and agenda define the documentation that is required for the staff to complete the audit.

Note that, as the staff performs its audit, additional empirical models or relationships used in the EXEM BWR-2000 evaluation model may be identified that appear to have a significant effect on the calculated phenomena occurring at the time the peak cladding temperature in the hot bundle from the most severe analyzed LOCA, and that the staff may request documentation pertinent to those models.

Special Requests

The NRC requests that TVA provide or make available:

- A reasonable working space (conference room, office, cubicle, etc.) for the audit period at the audit site
- The audit documents in paper format as well as on a CD or several CDs in a text searchable format
- Reasonable access to cognizant engineering staff for interviews
- Reasonable access to engineering staff capable of exercising the subject codes
- At least one designated point of contact to track staff questions during the audit

Audit Products

Within 45 days of the audit exit meeting the NRC staff will generate an audit results summary report. The report will describe the audit plan, the documents that were audited by the staff, and the staff's findings.

The staff will generate a non-proprietary audit summary that will detail the audit scope, agenda, and NRC findings. Any documentation required for the staff's safety findings related to the Browns Ferry Unit 1 fuel transition request will be identified via requests for additional information in a process analogous to that delineated in NRR Office Instruction LIC-100.